



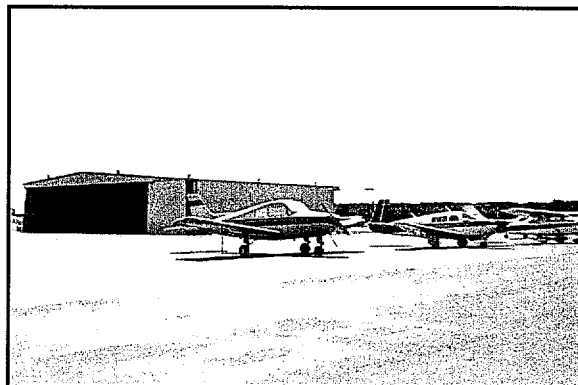
Chapter Two

AVIATION DEMAND FORECASTS

AVIATION DEMAND FORECASTS

Facility planning must begin with a definition of the demand that may reasonably be expected to occur at the facility over a specific period of time. In airport master planning, this involves forecasts of aviation activity indicators over a twenty-year planning period. In this master plan update, passenger enplanements, air cargo tonnage, based aircraft, and annual aircraft operations will be used as the basis for facility planning.

It is virtually impossible to predict with certainty year-to-year fluctuations of activity when looking twenty years into the future. Because aviation activity can be affected by many influences at the local, regional, and national level, it is important to remember that forecasts are to serve only as guidelines and planning must remain flexible enough to respond



to unforeseen facility needs. This makes it important to review the airport's activity on a regular basis to determine if changes to the guidelines are necessary.

The following forecast analysis examines recent developments, historical information, and current aviation trends to provide an updated set of forecasts for Yuma International Airport. The intent is to permit the Yuma County Airport Authority to make the planning adjustments necessary to ensure that the facility meets projected demands in an efficient and cost-effective manner.

NATIONAL AVIATION TRENDS

Each year, the Federal Aviation Administration (FAA) publishes it

national aviation forecast. Included in this publication are forecasts for air carriers, regional/commuters, general aviation, military, and FAA workloads. The forecasts are prepared to meet budget and planning needs of the constituent units of the FAA and to provide information that can be used by state and local authorities, the aviation industry, and by the general public. The current edition when this chapter was prepared was *FAA Aviation Forecasts - Fiscal Years 1997-2008*. The forecast uses the economic performance of the United States as an indicator of future aviation industry growth. Similar economic analyses are applied to the outlook for aviation growth in international markets.

For the U.S. aviation industry, the outlook for the next twelve years is for moderate economic growth, declining real fuel prices, and modest inflation. Based on these assumptions, aviation activity by fiscal year 2008 is forecast to increase by 17.0 percent at combined FAA and contract towered airports and 24.6 percent at air route traffic control centers. The general aviation active fleet is projected to increase by almost 8.4 percent while general aviation hours flown are forecast to increase by 12.9 percent. Scheduled domestic passenger enplanements are forecast to increase 61.3 percent -- air carriers increasing 58.0 percent and regional/commuters growing by 85.9 percent.

COMMERCIAL AIRLINES

After several consecutive years of little or no passenger growth, the commercial

aviation industry experienced its third consecutive year of substantial growth in 1996. Passenger enplanements that had averaged 1.0 percent growth between 1990 and 1993, grew at an average annual rate of 6.2 percent from 1994 to 1996. This growth is attributed, in part, to continuing U.S. economic growth and to the restructuring taking place in the industry.

The financial performance of the airline industry continued to improve as well over the last three years. After four years of operating losses totaling \$5 billion, the industry has reported cumulative operating profits of \$13.8 billion over the last three years. In 1996, U.S. carriers reported operating profits of almost \$6 billion, a record for a single year's financial performance. All twelve major airlines experienced an operating profit in 1996, compared with only nine the previous year. The continued financial success has been largely based upon capacity control, strong traffic growth, and the firming of yields.

Changes in the industry structure are creating pressures toward lowering costs. First is the continuing wave of new entry, low-cost, low-fare airlines. These new entrants provide additional industry competition. Secondly, many of the larger, older carriers are restructuring in an attempt to reduce their unit costs. This restructuring includes route realignment, service reduction or withdrawal from unprofitable routes, turning over short haul routes to code-sharing regional airlines, and work rule changes and wage concessions. While the industry

has not experienced a merger since 1994, a limited number of mergers are expected in the future, with new viable carriers emerging from the large number of new-entrant carriers. Recently, Western Pacific Airlines and Frontier Airlines have evaluated a merger. Valujet Airlines and AirTran Airways have completed a merger. An emerging trend is the development of "two-tier" airlines, such as United's West Coast Shuttle service, Delta's new airline Delta Express, and US Airway's low-cost service, which are structured for low cost operation. If these operations are successful, this could provide other carriers an additional means to lower costs.

Another factor influencing the airline industry is the spread of employee ownership in majority interest in the major carriers. With the changes in incentive and employee outlook expected, employee ownership appears to be a positive step for the basic goal of lowering the cost structure of larger carriers.

The industry is expected to continue toward globalization, through code-sharing agreements. The United States has been trying to create a more competitive international environment for its airlines through the development of multinational agreements. If agreements can be reached for a more open system, it is expected that the more efficient U.S. airlines could experience higher growth than what is now projected.

New aircraft deliveries totaled 457 in 1996, a decline of 6.2 percent over 1995.

This decline reflects the industry's dismal financial performance in the early 1990's which led to route restructuring, cost-cutting programs, and few aircraft orders. On the other hand, new commercial aircraft orders exceeded 1,000 in 1996 (a 91.6 percent increase over 1995). Narrowbody aircraft made up the majority of new aircraft orders. New aircraft orders are expected to continue to be strong as the airline's financial performance and passengers continue to grow and the airlines must remove older aircraft from the fleet to meet federal noise guidelines.

The FAA projections for domestic and international commercial service passenger enplanements indicate relatively strong growth. Domestic enplanements are projected to grow at an average annual rate of approximately 4.1 percent through the year 2008. International enplanements are projected to grow at an annual average rate of 5.7 percent during the same period.

REGIONAL/COMMUTER AIRLINES

Despite no growth in regional airline enplanements in 1995 (due in part to the temporary grounding of ATR aircraft), changes in major airline hubbing operations, and the competitive impact of the United Shuttle on the West Coast, the regional/commuter airline industry continues to be the fastest growing segment of the commercial aviation industry. Over the past three years, regional/commuter airline enplanements grew at an

average annual rate of 7.2 percent. During the 1990's, regional/commuter airline enplanements grew by 79.1 percent, triple that of the larger jet carriers' 26.0 percent growth.

In the future, industry growth is expected to outpace that of the larger commercial air carriers and be driven by the increased demand for aviation services. The introduction of new state-of-the-art aircraft, especially large high-speed turboprops and regional jets with ranges of up to 1,000 miles, opens up new opportunities for growth in nontraditional markets. However, the role of the regional airline industry will remain that of feeding traffic to the major and national carriers even as they expand into markets with longer route segments.

The FAA is anticipating that the future rate of growth in enplanements will be lower than that experienced in the past. A factor contributing to the anticipated slower growth rate is that the larger commercial carriers are operating at relatively high load factors which tends to diminish the value of additional feeder traffic. Until the major and national carriers begin to add fleet capacity, they will not require significant increases in feeder traffic from the regional partners. The FAA's projection of regional/commuter enplanements is reflected on **Exhibit 2A**.

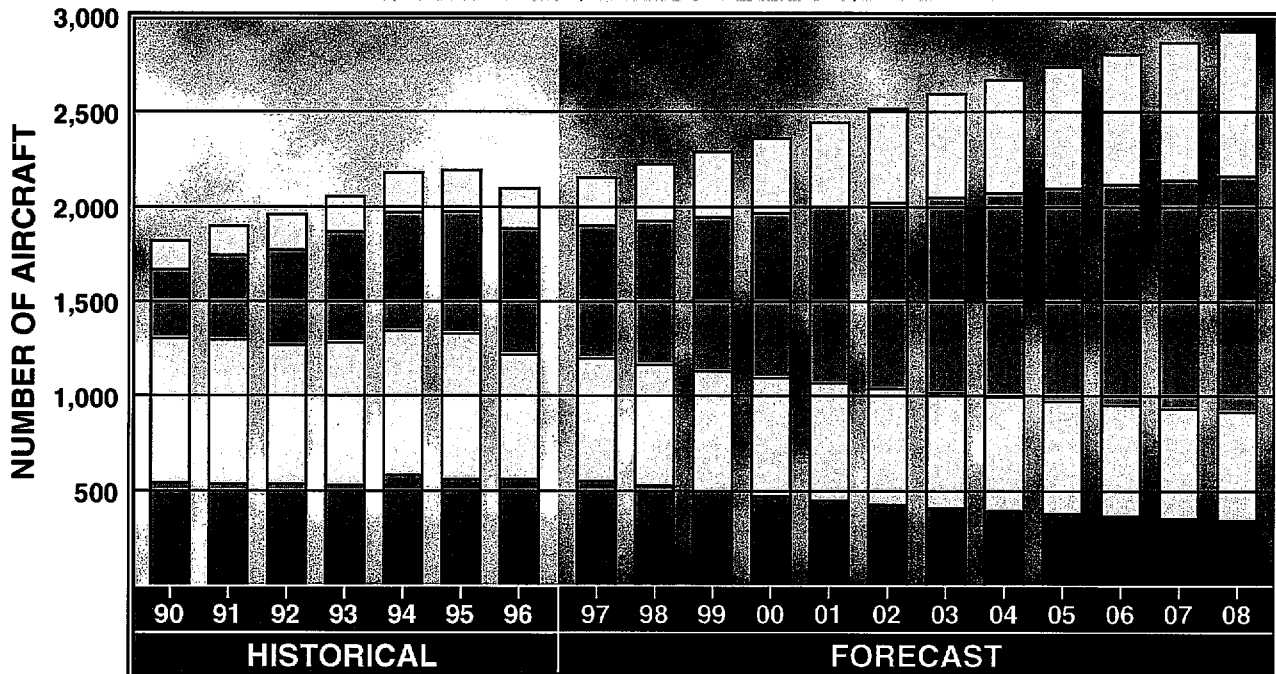
Revenue passenger miles are expected to increase at a faster rate than enplanements because the regional airlines are moving into larger aircraft having longer ranges. This will open up

additional markets for the regional/commuter operators. Thus the average passenger trip length is expected to increase during the forecast period, but the regional/commuter carriers will continue to serve primarily shorter-haul markets. The emphasis will be on improved service quality and schedule frequency in the markets best suited to their operations.

It is also expected that the regional/commuter aircraft fleet will continue to grow during the forecast period. The average seats per aircraft are expected to increase 1.9 percent annually over the FAA's 12-year forecast period, from 30.5 in 1996 to 38.1 in 2008. The most significant change in the fleet composition will result from the introduction of regional jet aircraft, many of which fall into the "40 to 60-seat" category. These aircraft will contribute to increased public acceptance of regional airline service, and will offer greater potential for replacement service on selected jet routes. The greatest growth in the fleet is expected to occur in the "20 to 40 seats" and "greater than 40 seats" categories, as reflected on **Exhibit 2A**. This is due to the continued substitution of service and new route opportunities created through the use of larger, longer range regional aircraft.

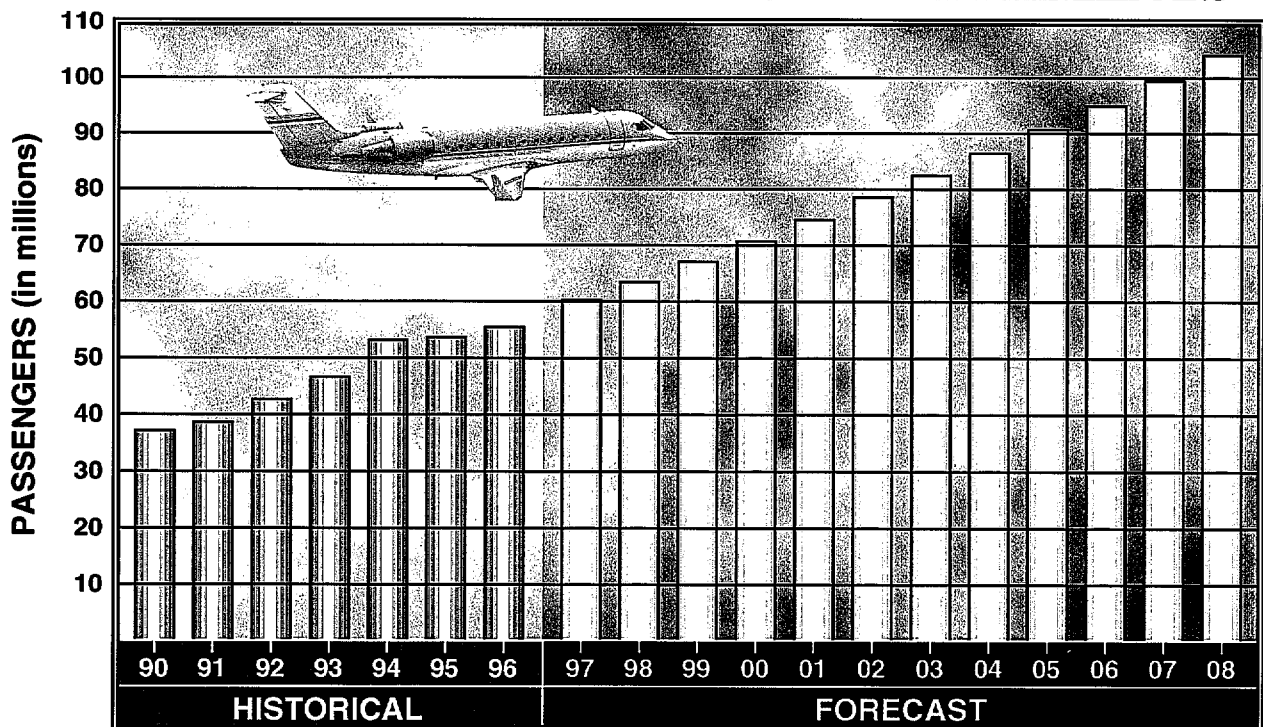
The average passenger trip length in the 48 contiguous states is projected to increase from 228.4 miles in 1996 to 276.3 miles in 2008. The growth in the average passenger trip length and resulting growth in revenue passenger miles (RPM's) will be driven, in large part, by the increased introduction of

PASSENGER AIRCRAFT



Source: FAA Aircraft Utilization and Propulsion Reliability Report/FAA Aviation Forecasts, FY 1997-2008

SCHEDULED PASSENGER ENPLANEMENTS



Source: BTS, Form's 298-C and 41, U.S. Department of Transportation/
FAA Aviation Forecasts, FY 1997-2008

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Exhibit 2A

U.S. REGIONAL/COMMUTER FORECASTS

larger high-speed turboprop and regional jet aircraft.

GENERAL AVIATION

In 1996, general aviation completed its second year of operations following the passage of the General Aviation Revitalization Act of 1994 (federal legislation which limits the liability on general aviation aircraft to 18 years from the date of manufacture). This legislation sparked an interest to renew the manufacturing of general aviation aircraft due to the reduction in product liability and a renewed optimism for the industry. The high cost of product liability insurance was a major factor in the decisions by many American aircraft manufacturers to slow or discontinue the production of general aviation aircraft.

In 1996, general aviation aircraft shipments were up 9.4 percent following a 12.9 percent increase in 1995. Piston-engine aircraft shipments were up 4.3 percent and turboprop shipments were up 21.8 percent. Billings for general aviation aircraft were down; however, this decline reflects the change in the mix of aircraft shipments which includes increasing numbers of lower-priced piston powered aircraft. The amateur-built aircraft market continues to show steady growth, just as it has over the past 25 years.

Despite a small decline in the number of active pilots, student pilot starts were up 5.0 percent, the first increase since 1990. These student pilots are the future of general aviation and are one of

the key factors impacting the future direction of the general aviation industry. This increase combined with the increases in piston-powered aircraft shipments and aircraft production are a signal that many of the industry initiated programs to revitalize general aviation are taking hold.

The most notable trend in general aviation is the continued strong use of general aviation aircraft for business and corporate uses. In 1995 (the latest year of recorded data), the number of hours flown by the combined use categories of business and corporate flying represented 24.7 percent of total general aviation activity increasing from 23.3 percent of total general aviation activity in 1994. In 1990, the number of hours flown by the combined use categories of business and corporate flying represented 21.8 percent of total general aviation activity.

Exhibit 2B depicts the FAA forecast for active general aviation aircraft in the United States. The FAA forecasts the general aviation active aircraft to increase at an average annual rate of 0.8 percent over the next 12 years, increasing from 181,341 in 1996 to 196,600 in 2008. Over the forecast period, the active fleet is expected to increase by almost 1,300 annually considering approximately 2,000 annual retirements of older piston aircraft and new aircraft production at 3,000 to 4,000 annually. Turbine-powered aircraft are projected to grow faster than all other segments of the national fleet and grow 1.3 percent annually through the year 2008. This includes the number of turboprop aircraft growing from 4,530 in

1996 to 5,200 in 2008 and the number of turbojet aircraft increasing from 4,577 in 1996 to 5,400 in 2008. Amateur built aircraft are projected to increase at an average annual rate of 1.0 percent over the next twelve years, increasing from 16,382 in 1996 to 18,400 in 2008.

AIRPORT SERVICE AREA

The service area of an airport is defined by its proximity to other airports providing similar services. The service area may be examined from a commercial service perspective, or from the perspective of the general aviation users, who may be affected by services provided at other general aviation airports in the area.

Yuma International Airport is the only airport in southwestern Arizona providing scheduled commercial passenger services. Phoenix, Arizona (187 miles northeast) and San Diego, California (171 miles west) provide the nearest commercial service airport locations. While the passenger service area for Yuma International Airport may extend into portions of southeastern California, Yuma County provides the source for the majority of locally originating passengers. Yuma International Airport functions as a commuter service airport, feeding passengers into the Phoenix and Los Angeles airline hubs.

Yuma International Airport also accommodates general aviation activity. General aviation is a term used to describe a diverse range of aviation activities which includes all segments of

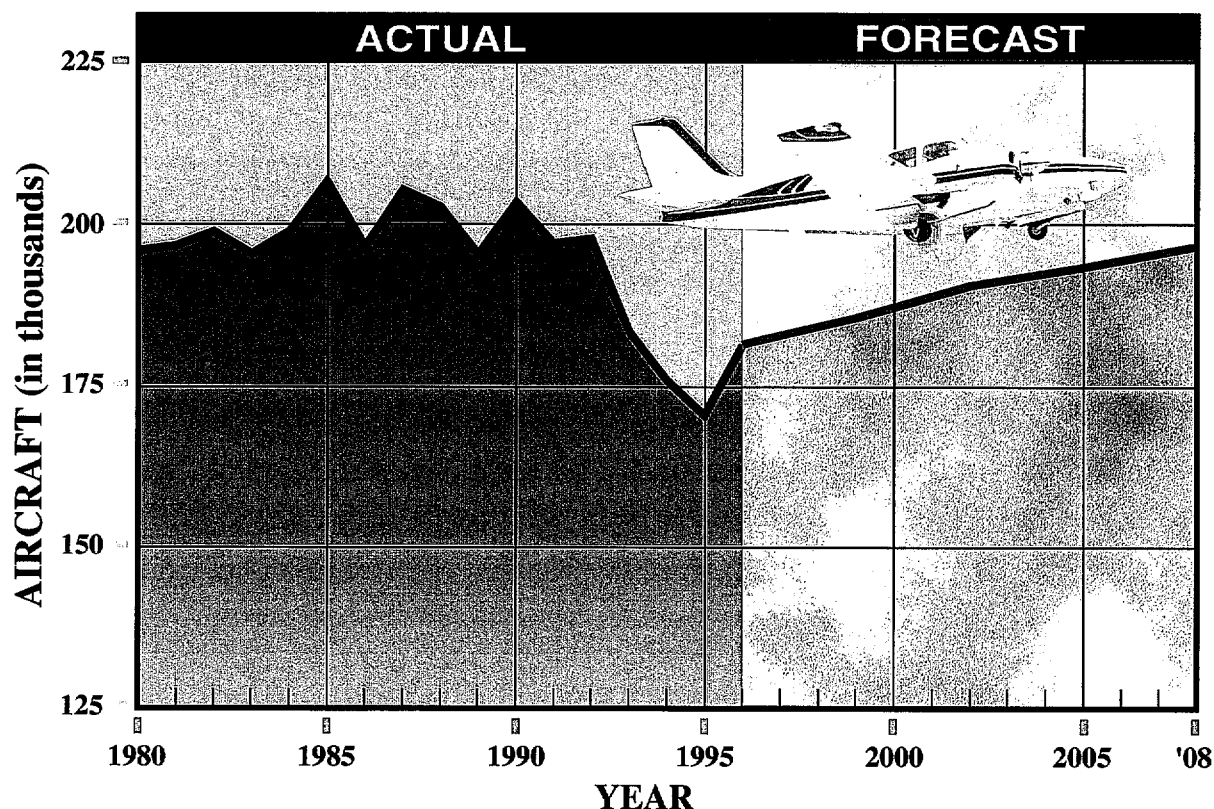
the aviation industry except commercial air carriers and military. General aviation is the largest component of the national aviation system and includes activities ranging from pilot training, to recreational flying, and the use of sophisticated turboprop and turbojet aircraft for business and corporate uses.

The general aviation service area is normally impacted by other airports providing similar levels of service within 30 nautical miles of the airport; however, there is only one public-use airport within 30 nautical miles of Yuma International Airport - Rolle Airfield, 10 nautical miles southwest. As mentioned previously in Chapter One, there are no general aviation services provided at Rolle Airfield. Therefore, Yuma International Airport can be considered the exclusive airport providing general aviation services in southwestern Arizona and portions of southeastern California.

POPULATION PROJECTIONS

Local population forecasts provide an indication of the potential for sustaining growth in aviation activity over the planning period, therefore, population projections for both the City of Yuma and Yuma County have been examined. Since 1980, the City of Yuma population has grown at an average annual rate of 2.4 percent, increasing from 42,481 in 1980 to 60,475 in 1995. Historically, total county population has grown faster than in the City of Yuma. Since 1980, the Yuma County population has grown at an average annual rate of 3.4 percent,

ACTIVE GENERAL AVIATION AIRCRAFT



U.S. ACTIVE GENERAL AVIATION AIRCRAFT (in thousands)

As of January 1	FIXED WING				ROTORCRAFT				
	PISTON		TURBINE		ROTORCRAFT		Experimental	Other	Total
	Single Engine	Multi- Engine	Turboprop	Turbojet	Piston	Turbine			
1996	128.8	16.6	4.5	4.6	1.5	3.6	16.4	5.3	181.3
1999	132.0	16.8	4.6	4.8	1.4	3.6	17.0	5.4	185.6
2002	135.4	17.0	4.8	5.0	1.4	3.6	17.5	5.6	190.3
2005	137.4	17.2	5.0	5.2	1.3	3.6	18.0	5.7	193.4
2008	139.5	17.4	5.2	5.4	1.2	3.6	18.4	5.9	196.6

Source: FAA Aviation Forecasts, Fiscal Years 1997-2008.

Notes: Detail may not add to total because of independent rounding. An active aircraft must have a current registration and it must have been flown at least one hour during the previous calendar year.

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Exhibit 2B

U.S. ACTIVE GENERAL AVIATION
AIRCRAFT FORECASTS

increasing from 76,205 in 1980 to 121,875 in 1995.

The Arizona Department of Economic Security projects a slower growth rate for both the City of Yuma and Yuma County. The City of Yuma population is projected to grow to 99,831 by 2020, an average annual growth rate of 2.0 percent. For Yuma County, the population is projected to increase to 209,861 by 2020, averaging an annual growth rate of 2.2 percent.

Table 2A summarizes historical and forecast population for the City of Yuma and Yuma County.

TABLE 2A Historical and Forecast Population		
Year	City of Yuma	Yuma County
Historical		
1980	42,481	76,205
1990	54,923	106,895
1995	60,475	121,875
Forecast		
2000	67,809	138,025
2005	74,347	154,582
2010	81,868	171,689
2015	90,271	189,783
2020	99,337	209,861
Source: Arizona Department of Economic Security		

COMMERCIAL SERVICE FORECASTS

To determine the types and sizes of facilities necessary to accommodate airline activity, three basic elements of this activity must be forecast. These

forecast elements include: annual enplaned passengers; fleet mix; and annual aircraft operations.

Annual enplaned passengers is the most basic indicator of the demand for airline activity. After developing a forecast of annual enplanements, aircraft operations can be projected based on factors characteristic of Yuma International Airport.

AIR SERVICE

Airline activity at Yuma International Airport presently consists exclusively of regional airline activity providing service to Phoenix and Los Angeles. In September 1997, there were three air carriers serving Yuma: Delta Connection (Skywest), America West Express (Mountain West Airlines) and United Express (Westair). United Express provided direct service to Los Angeles using Jetstream J31 aircraft configured for 19 seats. Delta Connection also provided direct service to Los Angeles using Embraer 120 Brasilia aircraft configured for 30 seats. America West Express provided direct service to Phoenix using Beechcraft 1900 aircraft configured for 19 seats. There were a total of 23 departures each weekday, with 13 to Phoenix and 10 to Los Angeles. Saturday service was reduced to 16 departures, 9 to Los Angeles and 7 to Phoenix.

On October 1, 1997, as part of a restructuring of the code sharing agreements between the regional air carriers (Skywest and West Air Airlines)

and United and Delta, Skywest discontinued operating as the Delta Connection Carrier between Yuma and Los Angeles and instead began operating as the United Express carrier. West Air Airlines, which had provided United Express service, ceased operations at Yuma International Airport. Skywest increased its service from five to six daily departures to Los Angeles. (As of January 1999, United Express [Skywest] provided six daily flights to Los Angeles while America West Express [Mesa] provided six daily flights to Phoenix.)

Historical passenger enplanements and the annual percentage change since 1986, along with the total U.S. Regional/Commuter Passenger Enplanements

and the local percentage of the national total (market share) for the period from 1986 to 1996 are summarized in **Table 2B**. After a substantial increase in enplanements between 1986 and 1987 as America West Express commenced service to Yuma, annual enplanements declined steadily for four straight years, falling to 60,499 in 1991 from 71,202 in 1987. Annual enplanement totals have grown steadily since 1991, averaging an annual growth rate of 3.3 percent. From January to August 1997, the airport recorded 51,877 enplanements, 2.8 percent higher than the same period in 1996. While enplanements have grown steadily each year since 1991, the airport's share of national enplanements has declined as national enplanement growth has outpaced growth at Yuma.

TABLE 2B
Historical Passenger Enplanements, Growth Rates, and Market Shares

Year	Yuma Passenger Enplanements ¹	Annual Percentage Changes	U.S. Regional/Commuter Passenger Enplanements ²	Yuma Market Share
1986	48,371	N/A	23,300,000	.208%
1987	71,202	47.2%	25,600,000	.278%
1988	68,368	-3.9%	28,400,000	.241%
1989	65,453	-4.2%	30,700,000	.213%
1990	61,626	-5.8%	35,500,000	.174%
1991	60,499	-1.8%	37,000,000	.164%
1992	62,257	2.9%	41,100,000	.151%
1993	64,423	3.4%	45,100,000	.143%
1994	65,625	1.8%	51,500,000	.127%
1995	70,970	8.1%	51,100,000	.139%
1996	73,591	3.7%	55,200,000	.133%

¹ Airport Records, 1992 Master Plan

² FAA Aviation Forecasts Fiscal Years 1997-2008

ENPLANEMENT FORECASTS

Several analytical techniques have been used to examine trends in passenger growth. These have included time series extrapolation, regression analysis, and market share analysis. While the potential time frames used in regression and time series analysis can be endless, some intuitive forecasting judgement was used to narrow the potential variables.

The acceptability of the time series or regression analyses is based upon the correlation between the data. The correlation coefficient (Pearson's "R") measures the association between changes in variables. The higher the R value, the more the separate sets of historical data are related in some manner. The lower the R value, the greater the chance that the sets of historical data are not related. Normally, regression analyses with an R value below 0.95 are not used in projections as they do not provide a reasonable assurance of correlation between the sets of historical data.

Initially, several time series regression analysis were performed on historical enplanement data from 1976 to 1996. The time series analysis for the period from 1992 to 1996 yielded the best result ($R=.976$) and was used to project enplanements through the year 2020.

A series of regression analyses were also performed for their applicability to this study. Regression analysis data included socioeconomic data pertaining to the City of Yuma and Yuma County. These analyses yielded correlation coefficients below 0.95, consequently

none of these analyses were used in enplanement projections.

A third forecast of passenger enplanements was developed using the average annual growth rate of enplanements from 1991 to 1996. Over this period, enplanements grew at an average annual rate of 3.3 percent.

Finally, a market share projection was developed using a static market share of total U.S. Regional/Commuter enplanements of 0.133 percent. Since FAA projections for total U.S. Regional/Commuter enplanements are only provided through the year 2008, the FAA forecast was extrapolated to the 2020 for purposes of this master plan.

FAA's *1996 Terminal Area Forecast (TAF)* and the *1995 State Aviation Needs Study (SANS)* provided comparative forecasts, and have been included in the summary of enplanements forecasts presented in **Table 2C**. The State forecasts used the enplanement levels forecast in the previous Yuma International Airport Master Plan through 2010, extrapolating that forecast to 2015. The *1996 FAA TAF* projects annual enplanements growing at 4.7 percent annually through 2010 while the *1995 SANS* projects enplanements growing 3.0 percent annually through 2015.

Presented on **Exhibit 2C** is a summary of all enplanement forecasts for Yuma International Airport. In all likelihood, actual activity will not follow any one of the projections exactly. It is more likely that annual enplanement levels will

fluctuate within the range of the projections depicted on **Exhibit 2C**. Thus, these lines serve more as a planning envelope. The planning envelope reflects a reasonable range for future annual enplanement levels at the airport. With this in mind, the time-

based projections of anticipated growth should serve only as a guide. At any given time over the planning period, the actual level of enplanements could fall within the envelope area defined by low range (Time Series 1992-1996) or the high range (Static Market Share).

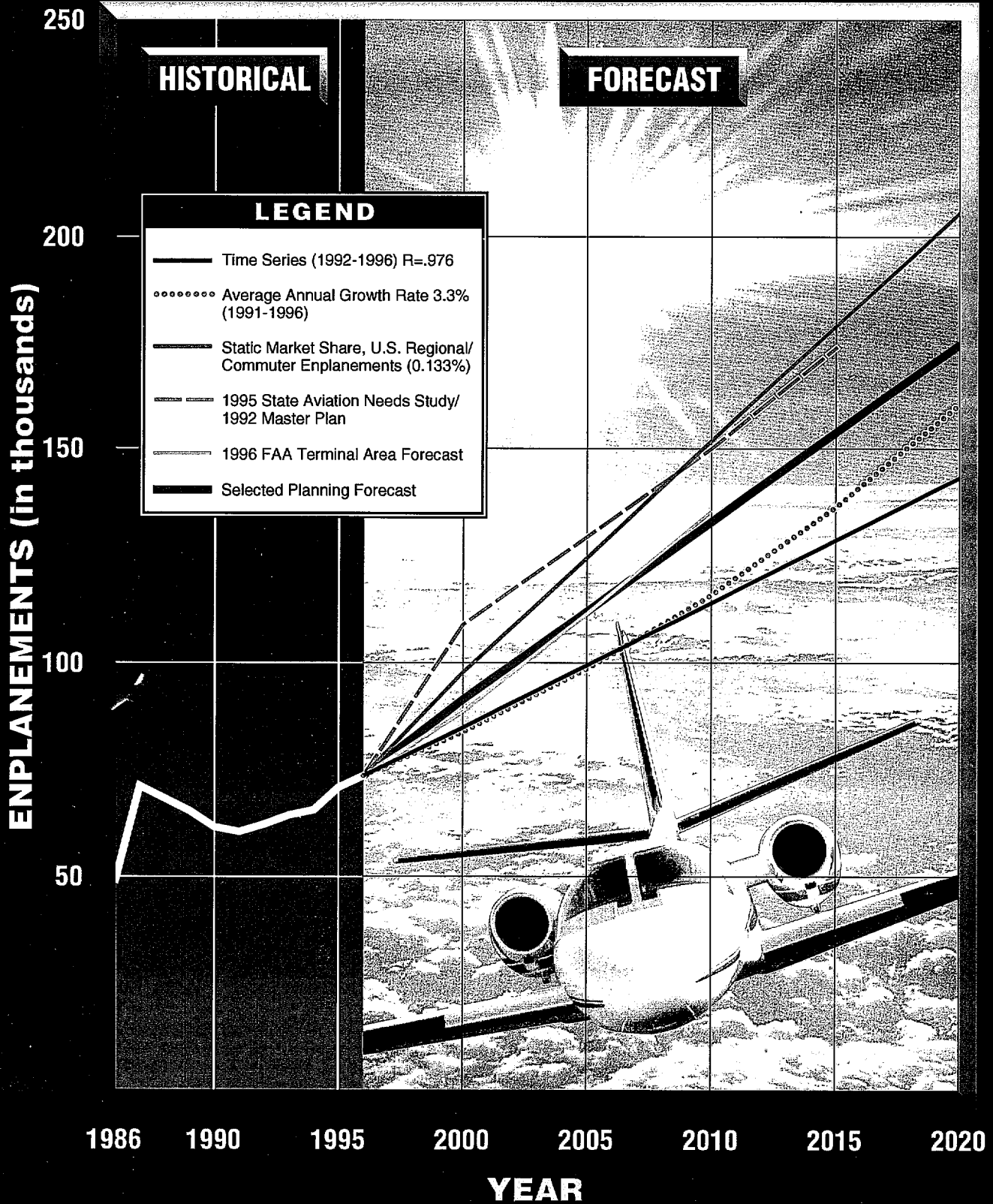
TABLE 2C
Summary of Passenger Enplanement Forecasts

	2000	2005	2010	2015	2020
Time Series (1992-1996) R=.976	84,900	99,500	114,100	128,700	143,300
Average Annual Growth Rate 3.3% (1991-1996)	83,800	98,600	115,900	136,400	160,400
Static Market Share, U.S. Regional/ Commuter Enplanements (0.133%)	97,800	124,600	151,900	178,900	205,800
<i>1995 State Aviation Needs Study / 1992 Master Plan</i>	109,000	129,500	150,000	173,700	N/A
<i>1996 FAA Terminal Area Forecast</i>	88,721	111,650	135,518	N/A	N/A
Selected Planning Forecast	91,000	112,000	133,000	154,000	175,000

Based upon the past five-year growth trend, growing local and regional economy and population, and the projected continuing trend for strong regional/commuter airline growth, a planning forecast was selected which reflects an average annual growth rate of 3.7 percent through the planning period. While deplaning passengers have not been included in the analysis, total deplanements over the past four years have averaged 108 percent of enplanements and are assumed to represent a similar percentage of enplanements in future years.

FLEET MIX AND OPERATIONS FORECASTS

The commercial service fleet mix defines a number of key parameters in airport planning, including critical aircraft, stage length capabilities, and terminal area gate configurations. A fleet mix projection for Yuma International Airport has been developed after reviewing the changes which have taken place over the past few years in the fleet composition, and the most recent information available on the new aircraft being purchased by the carriers serving the airport.



YUMA
International Airport

Exhibit 2C

PASSENGER ENPLANEMENT FORECASTS

Changes in equipment, airframes, and engines have always had a significant impact on airlines and airport planning. There are many on-going programs by manufacturers to improve performance characteristics. These programs are focusing on improvements in fuel efficiency, noise suppression, and the reduction of air emissions.

Regional/commuter airlines are transitioning to advanced turboprop aircraft and small regional jets to fit their respective market needs. These aircraft have greater seating capacity, stand-up headroom, and lower operating costs. For example, Mesa Airlines, which is the parent company of Mountain West Airlines (America West Express), operates a diverse fleet of aircraft ranging from turboprop to regional jet aircraft. Mountain West Airlines operates 19-seat Beechcraft 1900 aircraft and 37-seat DHC Dash 8-200's. Mesa Airlines currently plans to purchase 16 50-seat Canadair Regional Jets, with an option for 32 more. Skywest currently operates a fleet of 30-seat Embraer 120 Brasilia aircraft and 50-seat Canadair Regional Jets. The FAA views the introduction of regional jets as the most significant change in the future composition of regional/commuter fleet. Smaller turboprop aircraft (19 seats or less) are projected to account for only one-fifth of the overall commuter fleet in the future.

The long term outlook in fleet transition is dependent on traffic growth, technological improvements, and airfield facilities which can meet aircraft demands. **Table 2D** summarizes the 1996 fleet mix and operations, which have in turn been

used to project annual departures and total operations by the scheduled passenger airlines. It should be noted that as the fleet mix transitions into larger aircraft, the average number of seats per departure will increase, the number of enplanements per departure will increase, and the boarding load factor will reflect a slight increase through the planning period.

The anticipated change in airline service in October 1997 will have a negligible effect on the existing airline fleet mix as aircraft service in the 20-39 seat range will decrease only slightly to approximately 32 percent of the total fleet mix.

AIR CARGO FORECASTS

Air cargo is an encompassing term used to describe the combined activities of air mail and air freight/air express. The air cargo industry includes a diverse range of businesses providing a variety of different services supporting the movement of freight by air. This includes the all-cargo airlines, passenger airlines, freight forwarders and customs brokers, and air freight truckers.

The air cargo industry was deregulated in 1977, one year before passenger airline deregulation. Since deregulation, the composition of the carrier group providing cargo services has changed dramatically. Most notably is the emergence of the integrated all-cargo airlines such as FedEx, UPS, Airborne, and Emery.

TABLE 2D**Scheduled Airline Fleet Mix and Operations Forecast**

Fleet Mix Seating Capacity	1996	2000	2005	2010	2015	2020
≥ 60	0%	0%	0%	0%	0%	0%
40-59	0%	0%	0%	5%	5%	10%
20-39	34%	40%	45%	55%	60%	60%
≤ 19	<u>66%</u>	<u>60%</u>	<u>55%</u>	<u>40%</u>	<u>35%</u>	<u>30%</u>
Total	100%	100%	100%	100%	100%	100%
Average Seats Per Departure	23.5	24.2	24.9	27.9	28.4	29.9
Boarding Load Factor	35%	35%	36%	37%	38%	40%
Enplanements Per Departure	8.1	8.5	8.9	10.3	10.8	12.0
Annual Enplanements	73,591	91,000	112,000	133,000	154,000	175,000
Annual Departures	9,071	10,700	12,500	12,900	14,300	14,600
Annual Operations	18,142	21,400	25,000	25,800	28,600	29,200

Integrated air carriers are so named because they integrate the functions of the traditional all-cargo airlines (airport-to-airport line-haul services) and freight forwarders (pickup and delivery services). Similar to the trends affecting passenger airline companies, the all-cargo airline market has developed with the "hub and spoke" system. Additionally, the domestic air freight product mix has changed dramatically from heavyweight shipments to small package express services. Furthermore, this product shift has led to the all-cargo carriers dominance in the air freight industry. Prior to deregulation, the passenger airlines carried the majority of air freight in the "belly" of scheduled aircraft or by separate all-cargo operations. Today, most passenger airlines have suspended separate all-cargo operations but still provide air freight services on scheduled passenger aircraft flights.

While integrated carriers dominate the domestic air cargo market, freight forwarders and customs brokers remain a key element of the air cargo industry, particularly in international air freight, over-sized, and speciality freight. Freight forwarders deal directly with suppliers, purchasing line-haul transportation from airlines and providing ground transportation. Brokers specialize in processing necessary import/export documents. Air freight truckers provide local pickup and delivery services for passenger airlines and traditional all-cargo carriers, as well as transport international freight to and from major international hub airports. Presently, most international air freight in Arizona and southern California is shipped via this method to Los Angeles International Airport.

Presently, air cargo service at the airport is handled by both the

passenger airlines, and all-cargo carriers: FedEx, United Parcel Service (UPS), and Airborne Express. FedEx uses Cessna Caravan aircraft for its operations while UPS and Airborne service is provided utilizing Piper Navajo aircraft. These aircraft provide feeder services to Phoenix, where cargo is transferred to all-cargo jet aircraft. Currently, these operators transfer freight directly from the aircraft to vehicles on the apron.

The Yuma County Airport Authority (YCAA) follows an aggressive marketing campaign to bring air cargo to Yuma International Airport. This campaign focuses on the location of Yuma International Airport to effectively serve the growing Latin America and Asian Markets and as a possible reliever to Los Angeles International Airport, taking advantage of the airport's year-round delay free operations. International air cargo is one of the fastest growing segments of air transportation with North America to Asia and North America to Latin America forecast by Boeing to grow at 8 percent and 6.5 percent annually through the year 2015, respectively. Recently, the YCAA has promoted the use of the airport for the transport of high value off season fruits and vegetables grown in Northern Mexico, Southern California, and the Colorado River Valley. To support air cargo growth at the airport, the YCAA has established a Foreign Trade Zone at the airport.

SOUTHERN CALIFORNIA AIR CARGO

Since southern California is within the service area of Yuma International Airport, it is only appropriate to discuss air cargo demand in the region. Potential air cargo demand in southern California was analyzed by the Southern California Association of Governments (SCAG) and is summarized in **Table 2E**. As shown in the table, air cargo is expected to increase to 4,793,335 tons by the year 2020. Domestic freight is expected to comprise the majority of air cargo shipments, even though its percentage of total air cargo is expected to decline as international shipments increase. Continuing a trend since 1979, all-cargo aircraft are expected to provide the majority of air cargo lift in southern California.

Despite the forecast robust growth in air cargo, all of the air carrier airports included in the study (Los Angeles International Airport, Burbank-Glendale-Pasadena Airport, Long Beach Municipal Airport, John Wayne/Orange County Airport, and Ontario International Airport), face cargo capacity constraints to varying degrees. These include the intense urbanization surrounding each of these airports, the lack of available land area to expand existing airports or build new ones, airspace capacity constraints, ground access congestion and declining average highway speeds, environmental factors

(such as air quality which limit the number of aircraft operations at Ontario Airport), and noise regulations.

The 1992 SCAG report estimated that the Burbank and Long Beach airports could handle approximately three and four times the 1991 cargo levels, respectively. Ontario Airport was capable of handling 240% more, LAX 66% more, and John Wayne/Orange County Airport 57% more. With this

much available capacity, SCAG estimated that the region could only accommodate air cargo volumes forecast to the year 2000 and that air cargo handling capacity would have to increase an additional 63% to accommodate forecast 2010 volumes. The report noted that potential base conversions and improved cargo handling efficiencies could provide additional air cargo capacity.

TABLE 2E Historical and Forecast Cargo Volumes By Type (Tons) Southern California Association of Governments Region								
Cargo Type	1979	% of Total	1991	% of Total	2000	% of Total	2010	% of Total
Freight								
Domestic	606,439	(76.9)	958,240	(67.8)	1,484,040	(60.0)	2,529,922	(58.0)
International	<u>181,864</u>	(23.1)	<u>455,360</u>	(32.2)	<u>989,360</u>	(40.0)	<u>1,832,013</u>	(42.0)
Subtotal	788,303	85.5	1,413,360	88.9	2,473,400	90.0	4,361,935	91.0
Mail								
Domestic	121,295	(90.9)	166,026	(93.9)	241,844	(88.0)	362,376	(84.0)
International	<u>12,188</u>	(9.1)	<u>10,778</u>	(6.1)	<u>32,978</u>	(12.0)	<u>36,024</u>	(16.0)
Subtotal	133,483	14.5	176,804	11.1	274,822	10.0	431,400	9.0
Total	921,786	100.0	1,590,164	100.0	2,748,222	100.0	4,793,335	100.0
Volume of Air Cargo Transported By								
All-Cargo Aircraft	184,357	20.0	763,279	48.0	1,593,969	58.0	3,067,734	64.0
Passenger Aircraft	737,429	80.0	826,885	52.0	1,154,253	42.0	1,725,601	36.0
Source: Air Cargo in the SCAG Region; November, 1992								

EXPORTS

The following discussion provides an overview of the regional export market and trends between 1990 and 1996. This information was derived from a database of U.S. Exports of Merchandise compiled by the Bureau of the Census for 1990 and 1996. The export statistics reflect, in general, both government and non-government

exports of domestic and foreign merchandise. These statistics are compiled from copies of the Shipper's Export Declarations (SED'S) which are required by the U.S. Customs Service when merchandise is exported from the United States. The export statistics are summarized by U.S. Customs Service districts. For this analysis, export statistics for the Arizona, San Diego,

and Los Angeles Customs Districts have been gathered.

Table 2F summarizes total exports by air for each Customs district and total

growth between 1990 and 1996. As evident in the table, Los Angeles is the largest exporter in the region, however, exports from San Diego and Arizona have grown at a faster rate since 1990.

TABLE 2F Total Exports by Air (tons) Arizona, San Diego, Los Angeles Customs Districts			
	1990	1996	Percent Growth
San Diego	674,519	1,609,714	138.6%
Arizona	1,013,382	1,848,592	82.4%
Los Angeles	232,543,667	355,111,763	52.7%
Total for Region	234,231,569	358,570,069	53.1%
Source: Bureau of the Census, U.S. Exports of Merchandise			

Table 2G summarizes the leading commodities exported from each Customs District in 1996. Top exports from each part of the region include

machinery, electric and electronic items, agricultural products, and apparel products.

TABLE 2G Leading 1996 Exports by Air Arizona, San Diego, Los Angeles Customs Districts	
Commodity	Tons
<i>San Diego</i>	
Machinery and Parts	305,520
Electric Machinery and Electronic Equipment, Parts	303,543
Optic, Photo; Medical or Surgical Instruments	180,386
Special Classification Provisions, NESOI	165,365
Toys, Games, and Sport Equipment; Parts and Accessories	86,361
Miscellaneous Chemical Products	63,663
Leather Art, Saddlery Etc.; Handbags Etc.	45,790
Apparel Articles and Accessories (Knit or Crochet Items)	44,952
Paper and Paperboard Articles	35,514
Apparel Articles and Accessories (Not Knit)	35,131

TABLE 2G (Continued)**Leading 1996 Exports by Air****Arizona, San Diego, Los Angeles Customs Districts**

Commodity	Tons
Arizona	
Electric Machinery and Electronic Equipment, Parts	649,251
Machinery and Parts	236,966
Essential Oils Etc.; Perfumery, Cosmetics Etc.	176,599
Vehicles, Except Railway or Tramway, and Parts	107,525
Copper and Articles Thereof	80,800
Organic Chemicals	80,012
Optic, Photo; Medical or Surgical Instruments	57,581
Aircraft, Spacecraft, and Parts	52,941
Toys, Games, and Sport Equipment; Parts and Accessories	42,291
Sugars and Sugar Confectionary	31,578
Los Angeles	
Machinery and Parts	67,733,433
Electric Machinery and Electronic Equipment, Parts	55,241,989
Optic, Photo; Medical or Surgical Instruments	19,471,336
Vehicles, Except Railway or Tramway, and Parts	13,978,698
Aircraft, Spacecraft, and Parts	12,763,847
Edible Fruit and Nuts, Citrus Fruit or Melon	12,510,375
Edible Vegetables	11,519,903
Apparel Articles and Accessories (Knit or Crochet Items)	11,250,605
Plastics	11,189,144
Paper and Paperboard Articles	10,016,983
Source: Bureau of the Census, U.S. Exports of Merchandise	

Table 2H summarizes the top destinations for export products from each Customs District. Major Asian and European cities are among the top

destinations for exports from each of the customs district as well as are Canada and Mexico. Top Asian markets are primarily served from Los Angeles.

TABLE 2H
Leading 1996 Exports by Air Destinations
Arizona, San Diego, Los Angeles Customs Districts

Destination	Tons
<i>San Diego</i>	
Canada	340,208
Japan	268,941
United Kingdom	165,661
Federal Republic of Germany	133,107
Belgium	112,577
Switzerland	59,729
Netherlands	58,318
Republic of Korea	54,451
Russia	39,931
France	37,834
<i>Arizona</i>	
United Kingdom	515,278
Germany	285,305
Mexico	171,182
Canada	170,858
Japan	124,754
Brazil	58,465
Taiwan	54,650
France	52,787
Netherlands	41,609
Malaysia	38,658
<i>Los Angeles</i>	
Japan	86,216,324
Korea	31,341,441
Australia	30,302,194
United Kingdom	21,290,673
Singapore	20,340,988
Germany	18,304,635
Taiwan	16,143,944
Canada	13,661,820
Hong Kong	12,557,466
Malaysia	9,232,946
Source: Bureau of the Census, U.S. Exports of Merchandise	

AIR CARGO SCENARIOS FOR YUMA INTERNATIONAL AIRPORT

In approaching the development of air cargo forecasts for Yuma International

Airport, it is necessary to examine alternate scenarios which may be realized for air cargo utilization at the airport. The first examines a normal growth scenario, assuming the existing

mix of air cargo operators. A second scenario examines the establishment of international flights and air cargo operators from the airport.

Normal Growth Scenario

Most of the integrated all-cargo airlines have established a network of primary and regional hubs. Therefore, it is likely that this portion of air cargo service at Yuma International Airport will remain unchanged through the planning period, with the exception of the introduction of larger jet aircraft service as the market continues to

expand. The local FedEx operation is the fastest growing FedEx domestic location. Due to this strong growth, FedEx is considering upgrading service to include 727 jet aircraft service. **Table 2J** presents the normal growth scenario for Yuma International Airport, assuming the introduction of jet service. As has been experienced at other airports across the country, the airport should experience rapid growth in enplaned cargo as the cargo airlines providing jet service adjust ground transportation routes to accommodate the additional lift capacity of jet aircraft.

TABLE 2J Forecast Enplaned Air Cargo and Operations Normal Growth Scenario			
Year	Enplaned Air Cargo (lbs.)	Air Cargo Operations	Cargo Aircraft Total Landed Weights (lbs.)
<i>Historical</i>			
1996	579,757	1,044	7,621,200 (est.)
<i>Forecast</i>			
2000	3,100,000	2,600	11,600,000
2005	7,500,000	2,300	43,300,000
2010	10,100,000	2,500	61,200,000
2015	12,700,000	2,700	79,100,000
2020	17,900,000	2,900	114,800,000
Source for Historical Data: Airport Records			

International Air Cargo Scenario

This forecast assumes, in addition to the Normal Growth Scenario, the introduction of international air cargo service from the airport. This scenario assumes an international operation consisting of one flight per week

increasing to three weekly flights by the end of the planning period. Long range, heavy lift aircraft such as the Boeing 767, and/or McDonnell-Douglas MD-11 and DC-8 are assumed in the forecast. **Table 2K** summarizes enplaned air cargo, operations, and total landed weights under this scenario.

TABLE 2K
Forecast Enplaned Air Cargo and Operations
International Air Cargo Scenario

Year	Enplaned Air Cargo (lbs.)	Air Cargo Operations	Cargo Aircraft Total Landed Weights (lbs.)
<i>Historical</i>			
1996	579,757	1,044	7,621,200 (est.)
<i>Forecast</i>			
2000	9,100,000	2,700	30,500,000
2005	16,400,000	2,800	71,700,000
2010	21,900,000	3,100	99,000,000
2015	27,500,000	3,400	126,400,000
2020	35,700,000	3,900	171,500,000

Source for Historical Data: Airport Records

AIR CARGO FORECASTS SUMMARY

Future air cargo volumes at Yuma International Airport will be driven by the expanding regional economy and could potentially be impacted by increased air cargo volumes in southern California and the ability of the region to provide increased air cargo handling capacity. The existing airfield facilities can accommodate all existing aircraft currently used to transport air cargo. Additionally, a 17,800 square yard cargo apron is in place to serve air cargo aircraft. Facility planning should be flexible to future needs. Therefore, this master plan will examine air cargo apron, building, and access needs to not only effectively accommodate the existing feeder air cargo system, but also the possible use of the airport by large transport aircraft serving distant international markets.

GENERAL AVIATION FORECASTS

General aviation is defined as that portion of civil aviation which encompasses all facets of aviation except commercial operations. To determine the types and sizes of facilities that should be planned to accommodate general aviation activity, certain elements of this activity must be forecast. These indicators of general aviation demand include based aircraft, based aircraft fleet mix, and annual operations.

Future based aircraft demand at Yuma International Airport has been analyzed from a number of perspectives, including the airport's share of regional and national aviation markets. As shown in **Table 2L**, the percent of Yuma County registered aircraft based at Yuma International Airport

remained near 85 percent between 1991 and 1995. While the percentage of Yuma County registered aircraft based at Yuma International Airport declined to 78 percent between 1995 and 1996, this is attributable to a classification change in State records. The 1995 SANS projected Yuma County registered aircraft to grow to 205 by the year 2015, which would equate to a 1.7 percent annual growth rate from the 1996 figure of 138. Assuming a constant, or static share of Yuma

County registered aircraft yields 174 based aircraft by the end of the planning period. Based upon forecast local and regional population and economic growth, it is possible that the airport's share of Yuma County registered aircraft could increase through the planning period. An increasing market share of Yuma County registered aircraft yields 189 based aircraft by the end of the planning period.

TABLE 2L
Historical and Forecast Based Aircraft,
Yuma County Registered Aircraft, and Market Shares

Year	Yuma County Registered Aircraft	Yuma International Airport Based Aircraft	Percent of Yuma County Registered Aircraft Based at Yuma
<i>Historical</i>			
1991	123	105	85%
1992	123	105	85%
1993	119	101	85%
1994	139	120	86%
1995	137	112	82%
1996	138	108	78%
1997	138	118	85%
<i>Forecast</i>			
<i>Constant Share</i>			
2000	145	123	85%
2005	159	135	85%
2010	173	147	85%
2015	188	160	85%
2020 *	205	174	85%
<i>Increasing Share</i>			
2000	145	126	87%
2005	159	140	88%
2010	173	154	89%
2015	188	169	90%
2020 *	205	189	92%

Source for Historical Yuma County and Based Aircraft Data: Arizona DOT, Aeronautics Division

Source for Forecast Yuma County Registered Aircraft: 1995 SANS

* 2020 forecast for Yuma County registered aircraft extrapolated from 1995 SANS by Coffman Associates

Table 2M summarizes a market share analysis of national aircraft totals and Yuma International Airport based aircraft. Two market share forecasts have been prepared using this data. First, a constant, or static market share of based aircraft was applied to U.S. and Western Pacific Region active aircraft forecasts. Maintaining a constant market share of U.S. active aircraft, Yuma International Airport

can expect 136 based aircraft by 2020. A constant share of Western Pacific aircraft would yield 147 aircraft by 2020. Based upon the growth potential of the local and regional area, the market share of aircraft based at the airport may increase. According to the table, an increasing market share of U.S. active and Western Pacific aircraft yields 157 and 186 based aircraft, respectively.

TABLE 2M Regional and National Active Aircraft Market Share Analysis						
Year	Yuma Airport Based Aircraft	U. S. Active Aircraft	Yuma % of U. S. Active Aircraft	FAA WP Region Aircraft	Yuma % of WP Region Aircraft	
1991	105	198,000	.053%	34,900	.30%	
1992	105	198,500	.052%	36,500	.28%	
1993	101	184,400	.054%	31,400	.32%	
1994	120	176,000	.068%	29,600	.40%	
1995	112	170,600	.065%	28,200	.39%	
1996	108	181,200	.059%	29,500	.36%	
1997	118	N/A	N/A	N/A	N/A	
FORECASTS						
Year	Yuma Airport Based Aircraft	U. S. Active Aircraft	Yuma % of U. S. Active Aircraft	FAA WP Region Aircraft	Yuma % of WP Region Aircraft	Yuma Airport Based Aircraft
Constant Share						
2000	120	187,600	.064%	31,800	.38%	120
2005	123	193,400	.064%	33,400	.38%	127
2010	128	199,900	.064%	35,200	.38%	134
2015	132	206,300	.064%	36,900	.38%	140
2020	136	212,800	.064%	38,700	.38%	147
Increasing Share						
2000	124	187,600	.066%	31,800	.40%	127
2005	132	193,400	.068%	33,400	.42%	140
2010	140	199,900	.070%	35,200	.44%	155
2015	149	206,300	.072%	36,900	.46%	170
2020	157	212,800	.074%	38,700	.48%	186
Source for Historical and Forecast U.S. Active and WP Region Aircraft: <i>FAA Aviation Forecasts 1997-2008</i> 2010, 2015, 2020 forecast for U.S. Active and FAA WP Region Aircraft extrapolated by Coffman Associates						

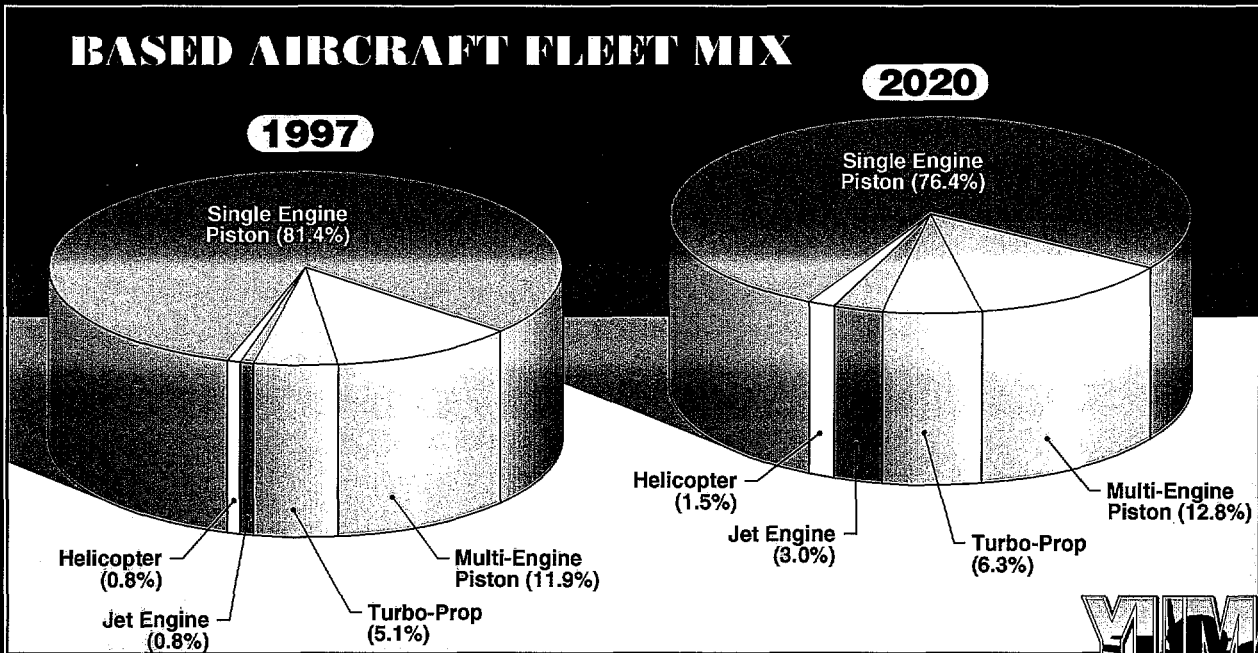
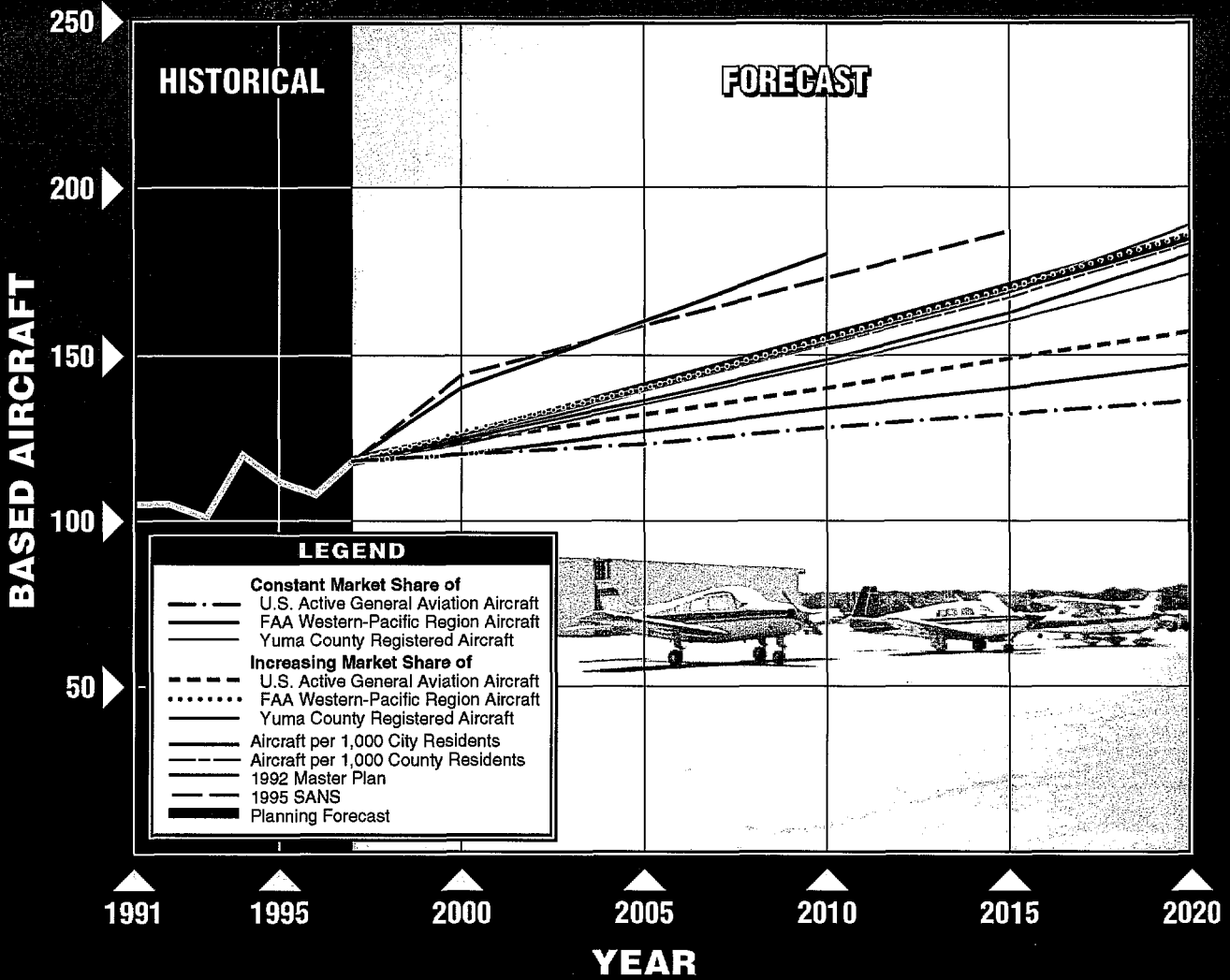
The last forecast method employed was an analysis of aircraft per 1,000 residents of the City of Yuma and Yuma County. Typically, as the population of an area increases, aircraft per 1,000 residents decreases. **Table 2N**

summarizes historical and forecast aircraft per 1,000 residents of the City of Yuma and Yuma County assuming a decreasing ratio of aircraft to 1,000 residents.

TABLE 2N					
Aircraft Per 1,000 Residents					
Year	Based Aircraft	City of Yuma Residents	Aircraft per 1,000 Residents	Yuma County Residents	Aircraft per 1,000 Residents
1990	102	54,923	1.86	106,895	.95
1995	112	60,475	1.85	121,875	.92
Forecasts					
Year	Based Aircraft	City of Yuma Residents	Aircraft per 1,000 Residents		
2000	125	67,809	1.84		
2005	136	74,347	1.83		
2010	149	81,868	1.82		
2015	163	90,271	1.81		
2020	179	99,337	1.80		
Year	Based Aircraft	Yuma County Residents	Aircraft per 1,000 Residents		
2000	126	138,025	.91		
2005	139	154,582	.90		
2010	153	171,689	.89		
2015	167	189,783	.88		
2020	183	209,861	.87		

The 1995 SANS and 1992 Master Plan provide comparative forecasts. The 1995 SANS used 1995 base year data and projected based aircraft growing at an average annual of rate of 1.8 percent, increasing to 187 by the year 2015. The 1992 Master Plan used 1990 base year data and forecast based aircraft growing at an average annual of rate of 2.8 percent, increasing to 180 by 2010.

Presented in **Table 2P**, and on **Exhibit 2D** is a summary of all forecasts for based aircraft at Yuma International Airport, including the planning forecast. The planning forecast reflects the airport capturing a larger portion of regional and national aviation markets over the planning period. Continued local and regional economic and population growth supports the long-range potential for based aircraft



YUMA
International Airport

growth at the airport. The planning forecast projects based aircraft at Yuma

International Airport growing at an average annual rate of 1.9 percent.

TABLE 2P Based Aircraft Forecast Summary					
	2000	2005	2010	2015	2020
Constant Market Share of					
U.S. Active General Aviation Aircraft	120	123	128	132	136
FAA Western-Pacific Region Aircraft	120	127	134	140	147
Yuma County Registered Aircraft	123	135	147	160	174
Increasing Market Share of					
U.S. Active General Aviation Aircraft	124	132	140	149	157
FAA Western-Pacific Region Aircraft	127	140	155	170	186
Yuma County Registered Aircraft	126	140	154	169	189
Aircraft Per Capita					
City Residents	125	136	149	163	179
County Residents	126	139	153	167	183
Other Forecasts					
1992 Master Plan	140	160	180	N/A	N/A
1995 SANS	144	159	173	187	N/A
Planning Forecast	125	140	155	170	185

Fleet Mix

Knowing the aircraft fleet mix expected to utilize the airport is necessary to properly plan facilities that will best serve the level of activity and type of activities occurring at the airport. The existing based aircraft fleet mix is comprised primarily of single-engine piston aircraft, but also includes multi-engine piston, turboprop, jet, and helicopter aircraft.

The forecast mix of based aircraft was determined by comparing existing and forecast U.S. general aviation fleet trends to the 1997 based aircraft fleet mix. The *FAA Aviation Forecasts Fiscal Years 1997-2008* was consulted for the

U.S. general aviation fleet mix trends and considered in the fleet mix projections. The trend in general aviation is toward a greater percentage of larger, more sophisticated turboprop, jet and helicopters, and a reduction in the number of single-engine piston aircraft.

The fleet composition of based aircraft at Yuma International Airport is expected to remain heavily in single-engine piston aircraft, although there is expected to be an increasing percentage of turboprop, jet, and helicopters in the future mix, consistent with national trends. **Table 2Q** and **Exhibit 2D** summarize based aircraft fleet mix projections for the airport.

TABLE 2Q**Projected Based Aircraft Fleet Mix**

Year	Total Based Aircraft	Single Engine	Multi Engine	Turbo Prop	Jet	Helicopter	Other
<i>Historical</i>							
1990	102	87	12	0	0	2	1
1997	118	96	14	6	1	1	0
<i>Forecast</i>							
2000	125	101	15	7	1	1	0
2005	140	112	17	8	2	1	0
2010	155	122	19	9	3	2	0
2015	170	132	21	10	4	2	0
2020	185	141	24	12	6	3	0
Source for Historical Data: 1990 - 1992 Master Plan; 1997 - Airport Records							

ANNUAL OPERATIONS

The air traffic control tower (ATCT) located on the airport collects information regarding aircraft operations (takeoffs and landings). **Table 2R** summarizes historical general aviation operations as observed

by the ATCT and operations per based aircraft. Annual general aviation operations have declined substantially since 1991 when the ATCT recorded 66,286 operations. In 1996, annual general aviation operations totaled 25,485 or 236 operations per based aircraft.

TABLE 2R**Historical General Aviation Annual Operations and Operations Per Based Aircraft**

Year	Based Aircraft	Annual Operations	Operations Per Based Aircraft
1991	105	66,286	631
1992	105	36,171	344
1993	101	44,435	440
1994	120	35,804	298
1995	112	27,091	242
1996	108	25,485	236

Forecast general aviation operations at Yuma International Airport have been prepared by examining the number of operations per based aircraft. For

forecasting purposes, two forecasts of operations per based aircraft have been developed. First, a constant, or static level of 240 operations per based

aircraft was applied to forecast based aircraft. This results in an operational level of 44,400 in 2020. Second, an increasing operations per based aircraft forecast has been developed. As shown in the table, an increasing operations per based aircraft results in an operational level of 57,400 in 2020.

Table 2S summarizes forecast general aviation operations for Yuma Inter-

national Airport. The planning forecast represents a doubling of aircraft operations over the planning period to account for additional activity resulting from increased numbers of based aircraft and increased itinerant use of the airport. The planning forecast projects annual operations at Yuma International Airport growing at an average annual rate of 2.9 percent.

TABLE 2S General Aviation Operations Forecasts					
	2000	2005	2010	2015	2020
Constant Operations Per Based Aircraft	30,000	33,600	37,200	40,800	44,400
Increasing Operations Per Based Aircraft	31,300	37,100	43,400	50,200	57,400
<i>Planning Forecast</i>	<i>30,000</i>	<i>35,000</i>	<i>40,300</i>	<i>45,900</i>	<i>51,800</i>

There are two types of general aviation operations at an airport: local and itinerant. A local operation is a take-off or landing performed by an aircraft that operates within site of the airport, or which executes simulated approaches or touch-and-go operations at the airport. Itinerant operations are those performed by aircraft with a specific origin or destination away from the airport. Generally, local operations are characterized by training operations. Typically, itinerant operations increase with business and industry use since business aircraft are used primarily to carry people from one location to another.

The historical records maintained by the ATCT do not reflect the local/itinerant splits for general aviation operations. Previous planning estimated that itinerant traffic represented approximately 70 percent of

general aviation operations as local training operations are limited due to the large number of high performance military jet aircraft which use the airport. Itinerant operations are forecast to increase through the planning period due to the expected increased utilization of business and corporate aircraft at the airport (which are typically itinerant operations). The projection of local and itinerant operations are summarized in the table at the end of this chapter.

Boeing/Douglas Products Division

The Boeing/Douglas Products Division test facility at the airport uses the airport for large aircraft certification. Aircraft operations consist of local and itinerant operations. The *1995 Airfield Condition Survey and Load Evaluation* completed by the MCAS estimated that

aircraft operations associated with the Boeing/Douglas Products Division test facility totaled 1,048 in 1995 (3.8 percent of total general aviation operations in 1995) and projected these operations growing to 1,950 annually through 2020 (3.0 percent of projected 2020 general aviation operations). Boeing/Douglas Products Division operations are included in the general aviation operational totals.

(Note: The Boeing/Douglas Products Division closed the Yuma test facility effective October 31, 1999.)

MILITARY FORECASTS

Projecting future military utilization of an airport is particularly difficult since local missions may change with little notice. However, existing operations and aircraft mix may be confirmed for their impact on facility planning. Currently, most military use of the airport is related to activities generated by the Yuma Marine Corps Air Station

(MCAS). Presently, AV-8 Harriers and F-5's are located at the MCAS. With the exception of a possible upgrade of the squadron of F-5 aircraft to F-16's, there are currently no military plans to increase the number of aircraft at the MCAS.

Military activity is the largest and most visible component of activity at the airport. While total military operations have declined since 1991, military activity has accounted for between 63 and 67 percent of total airfield activity. It is difficult to predict the pattern of military operations due to the ever-changing missions of military forces; however, there are currently no known changes that would significantly alter the type of military operations that are occurring at the airport. Therefore, for planning purposes, military operations are forecast at 75,000 annual operations through the planning period, consistent with previous planning. Historical military operations are summarized in **Table 2T**.

TABLE 2T
Historical Military Operations

Year	Total Military Operations	Total Airfield Operations	Percentage of Total Operations
1991	103,797	160,452	64.7%
1992	105,063	155,607	67.5%
1993	97,197	149,273	65.1%
1994	95,174	149,485	63.7%
1995	86,971	133,904	65.0%
1996	75,860	120,270	63.0%

Source: MCAS - Yuma

PEAKING CHARACTERISTICS

Most facility planning relates to levels of peak activity. The following planning definitions apply to the key peak periods:

- **Peak Month** - The calendar month when peak passenger enplanements or aircraft operations occur.
- **Design Day** - The average day in the peak month.
- **Busy Day** - The busy day of a typical week in the peak month.
- **Design Hour** - The peak hour within the design day.

It is important to recognize that only the peak month is an absolute peak within a given year. All the others will be exceeded at various times during the year. However, they do represent reasonable planning standards that can be applied without overbuilding or being too restrictive.

The peak month for passenger enplanements in 1996 was February with 8,123 enplanements, 11 percent of all 1996 enplanements. This percent-

age has been applied to the forecasts of annual enplanements to derive future peak month estimates. The design day has been calculated by dividing the peak month by 30. The design hour enplanements were estimated after reviewing peak hourly departures, aircraft seating capacity, and average load factors.

The peak month for airline operations in 1996 was also February, with 1,936 operations, 10.6 percent of total airline operations in 1996. The design day was calculated in the same manner as airline enplanements and the design hour operations were calculated after reviewing peak hour departures.

The peak month for recorded general aviation operations in 1996 was December with 2,549 operations, 10 percent of total general aviation operations in 1996. This percentage was applied to forecast general aviation operations to derive future peak month estimates. The forecast of busy day operations was calculated as 1.25 times design day activity. Design hour operations were calculated as 13 percent of design day operations. **Table 2U** summarizes peak activity forecasts for the airport.

TABLE 2U**Peak Period Forecasts**

	1996	2000	2005	2010	2015	2020
<i>Airline Enplanements</i>						
Annual	73,591	91,400	112,100	133,000	153,800	174,600
Peak Month	8,123	10,100	12,400	14,700	17,000	19,300
Design Day	271	337	413	490	567	643
Design Hour	58	72	88	104	121	137
<i>Airline Operations</i>						
Annual	18,142	21,580	25,060	25,820	28,560	29,200
Peak Month	1,936	2,300	2,670	2,760	3,050	3,120
Design Day	65	77	89	92	102	104
Design Hour	6	7	8	9	9	10
<i>General Aviation Operations</i>						
Annual	25,485	30,000	35,000	40,300	45,900	51,800
Peak Month	2,549	3,000	3,500	4,030	4,590	5,180
Busy Day	106	125	146	168	191	216
Design Day	85	100	117	134	153	173
Design Hour	11	13	15	17	20	22

ANNUAL INSTRUMENT APPROACHES

An instrument approach as defined by the FAA is "an approach to an airport with the intent to land by an aircraft in accordance with an Instrument Flight Rule (IFR) flight plan, when visibility is less than three miles and/or when the ceiling is at or below the minimum initial approach altitude." To qualify as an instrument approach at Yuma International Airport, aircraft must land at the airport after following one of the instrument approach procedures established for the airport.

No historical annual instrument approach data for the Airport is available from the FAA. Therefore, a projection of annual instrument

approaches has not been prepared. Annual instrument approach levels can be estimated, however, based on trends experienced at similar airports. Normally, annual instrument approaches account for one to two percent of total itinerant operations.

FORECAST SUMMARY

This chapter has outlined the various aviation demand levels anticipated at Yuma International Airport through the year 2020. A forecast of actual instrument approaches (AIA's) has not been included because of the historical low levels of AIA's, and the fact that inclement weather conditions only occur a very small majority of time in this type of climate. In 1996, a total of 20

AIA's were conducted by both military and civilian aircraft. This level of AIA's is well below planning thresholds established by the FAA for FAA funded approach equipment.

Long term aviation growth at Yuma International Airport will be sustained by the growing local and regional population and economy. Overall, aviation activity at the airport is forecast to exceed regional and national growth rates.

The next step in the master planning process is to assess the capacity of existing facilities to accommodate forecast demand and determine which facilities will need to be improved to meet these demands. This will be examined in the next chapter -- Chapter Three, Facility Needs Evaluation. **Table 2V** presents a summary of aviation forecasts development for Yuma International Airport.

TABLE 2V Aviation Forecast Summary						
	1996	2000	2005	2010	2015	2020
Enplanements	73,591	91,000	112,000	133,000	153,000	174,000
Deplanements	<u>79,471</u>	<u>98,000</u>	<u>121,000</u>	<u>144,000</u>	<u>165,000</u>	<u>188,000</u>
Total Passengers	153,062	189,000	233,000	277,000	318,000	362,000
Based Aircraft	118 ¹	125	140	155	170	185
Enplaned Air Cargo (lbs.)						
Normal Growth Scenario	579,757	3,100,000	7,500,000	10,100,000	12,700,000	17,900,000
International Cargo Scenario	579,757	9,100,000	16,400,000	21,900,000	27,500,000	35,700,000
Annual Operations						
Airline	18,142	21,400	25,000	25,800	28,600	29,200
Cargo (Normal Growth)	1,044	2,600	2,300	2,500	2,700	2,900
Military	75,860	75,000	75,000	75,000	75,000	75,000
General Aviation						
Itinerant	17,839 ²	21,000	24,500	28,200	32,100	36,300
Local	<u>7,645²</u>	<u>9,000</u>	<u>10,500</u>	<u>12,100</u>	<u>13,800</u>	<u>15,500</u>
Total Annual Operations	120,530	129,000	137,300	143,600	152,200	158,900
¹ 1997						
² Estimated						